

### Features

- Low forward voltage drop
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low thermal resistance
- -40°C minimum operating  $T_j$
- Insulated package: TO-220FPAB
  - Insulating voltage: 2000 V DC
  - Capacitance: 45 pF
- ECOPACK<sup>®</sup>2 compliant component

### Description

This device is a dual center tap 200 V Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in TO-220AB, TO-220AB narrow-leads, TO-220FPAB and D<sup>2</sup>PAK, it is especially intended for use as secondary rectification in SMPS and is also ideal for all LED lighting applications.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	200 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.64 V

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode, unless otherwise stated)**

Symbol	Parameter				Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage				200	V
I <sub>F(RMS)</sub>	Forward rms current				30	A
I <sub>F(AV)</sub>	Average forward current, δ = 0.5, square wave	TO-220AB, D <sup>2</sup> PAK, TO 220AB narrow leads	T <sub>c</sub> = 160 °C	Per device	20	A
		TO-220FPAB	T <sub>c</sub> = 105 °C	Per device	20	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal, T <sub>amb</sub> = 25 °C			180	A
T <sub>stg</sub>	Storage temperature range				-65 to +175	°C
T <sub>j</sub>	Operating junction temperature range <sup>(1)</sup>				-40 to +175	°C

1.  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$  condition to avoid thermal runaway for a diode on its own heatsink

**Table 3. Thermal parameters**

Symbol	Parameter			Value	Unit
R <sub>th(j-c)</sub>	Junction to case	D <sup>2</sup> PAK, TO-220AB, TO-220AB narrow leads	Per diode Per device	1.30 0.75	°C/W
		TO-220FPAB	Per diode Per device	5.00 4.15	
R <sub>th(c)</sub>	Coupling	D <sup>2</sup> PAK, TO-220AB, TO-220AB narrow leads		0.20	
		TO-220FPAB		3.30	

General formula to calculate T<sub>J</sub>(diode1) and T<sub>J</sub>(diode2):

$$T_j(\text{diode1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode2}) \times R_{th(c)} + T_{case}$$

$$T_j(\text{diode2}) = P(\text{diode2}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode1}) \times R_{th(c)} + T_{case}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit	
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$			15	$\mu\text{A}$
		$T_j = 125\text{ °C}$			1.3	7	mA
		$T_j = 125\text{ °C}$	$V_R = 150\text{ V}$			4.5	
$V_F^{(1)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$			0.86	V
		$T_j = 125\text{ °C}$			0.64	0.70	V

1. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation:

$$P = 0.6 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$$

Note: *More information is available in the application notes:*

*AN604 Calculation of conduction losses in a power rectifier*

*AN4021 Calculation of reverse losses in a power diode*

Figure 1. Average forward power dissipation versus average forward current (per diode)

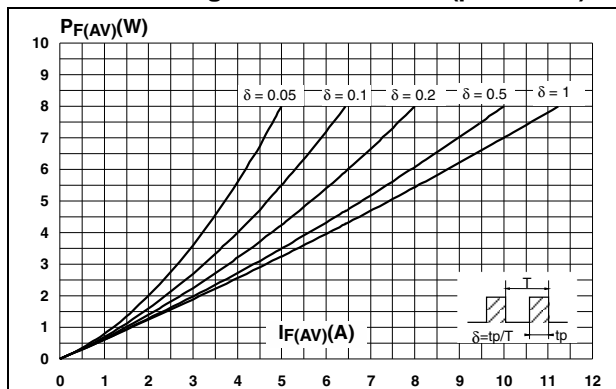


Figure 2. Forward voltage drop versus forward current (per diode)

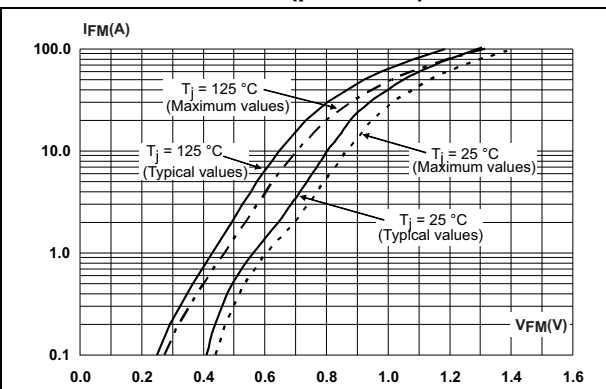


Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)

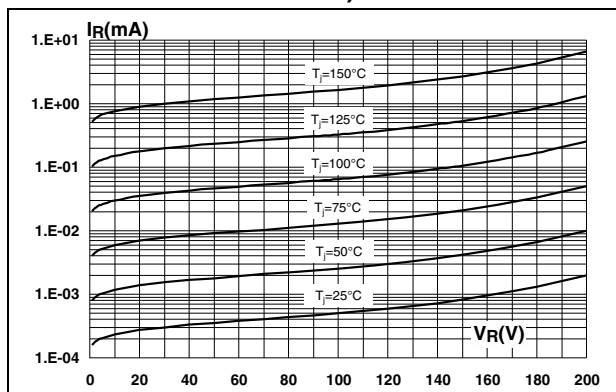


Figure 4. Junction capacitance versus reverse voltage applied (typical values, per diode)

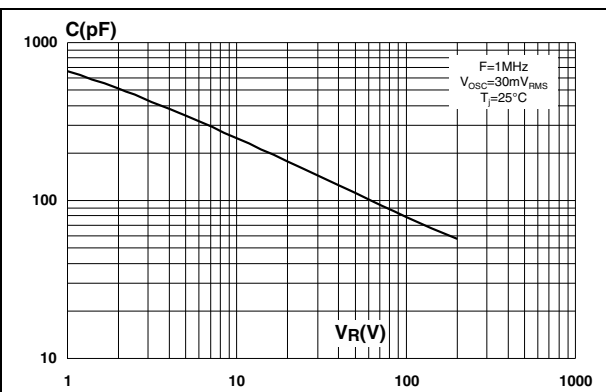


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

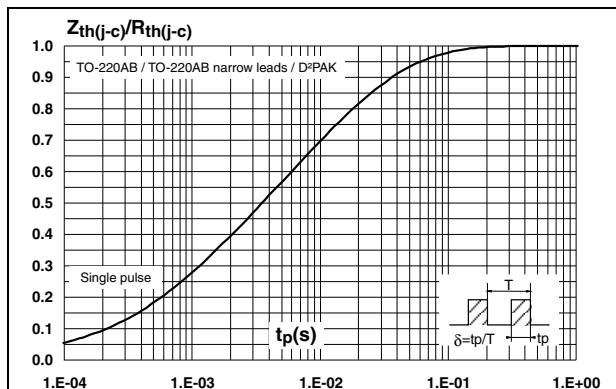


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

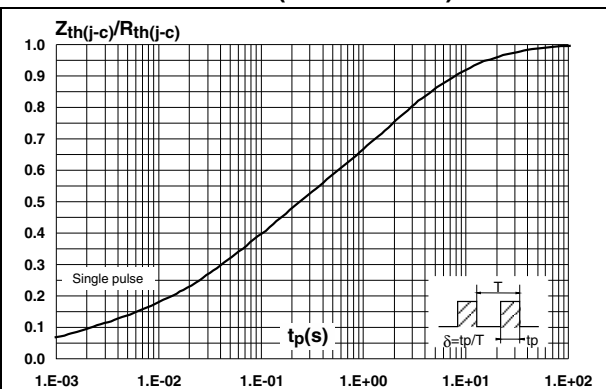
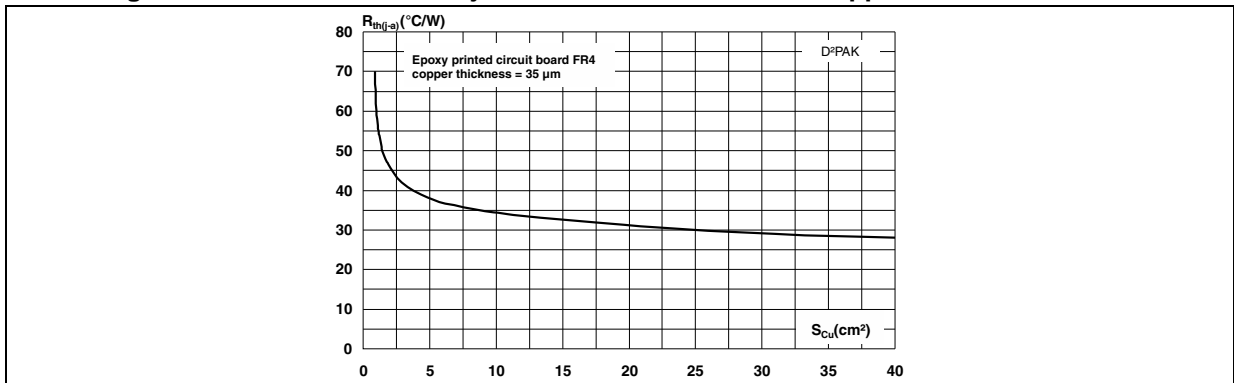


Figure 7. Thermal resistance junction to ambient versus copper surface under tab



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 8. TO-220AB dimension definitions

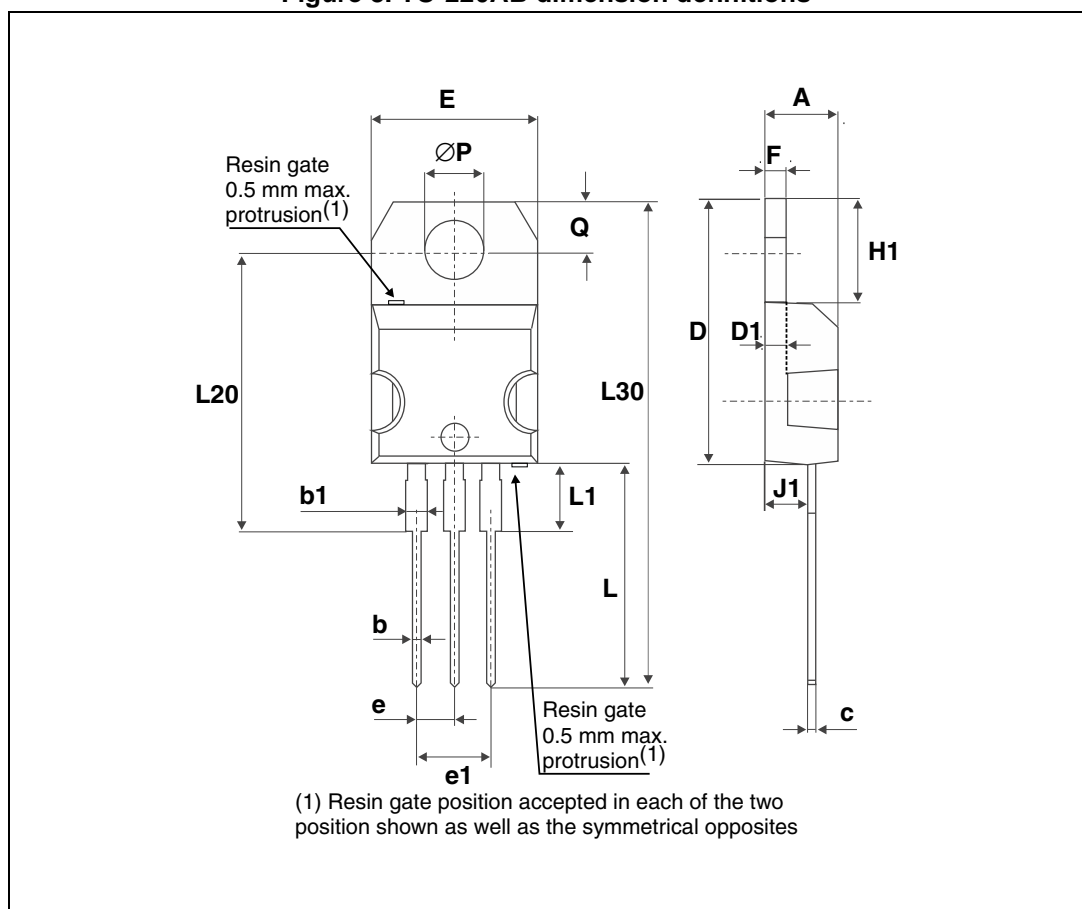


Table 5. TO-220AB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.035
b1	1.14		1.70	0.045		0.067
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1		1.27			0.05	
E	10		10.40	0.39		0.41
e	2.40	0.40	2.70	0.094		0.106
e1	4.95	0.60	5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.094		0.107
L	13		14	0.51		0.55
L1	3.50		3.93	0.137		0.154
L20		16.40			0.64	
L30		28.90			1.13	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95		0.104	

Figure 9. TO-220AB narrow leads dimension definitions

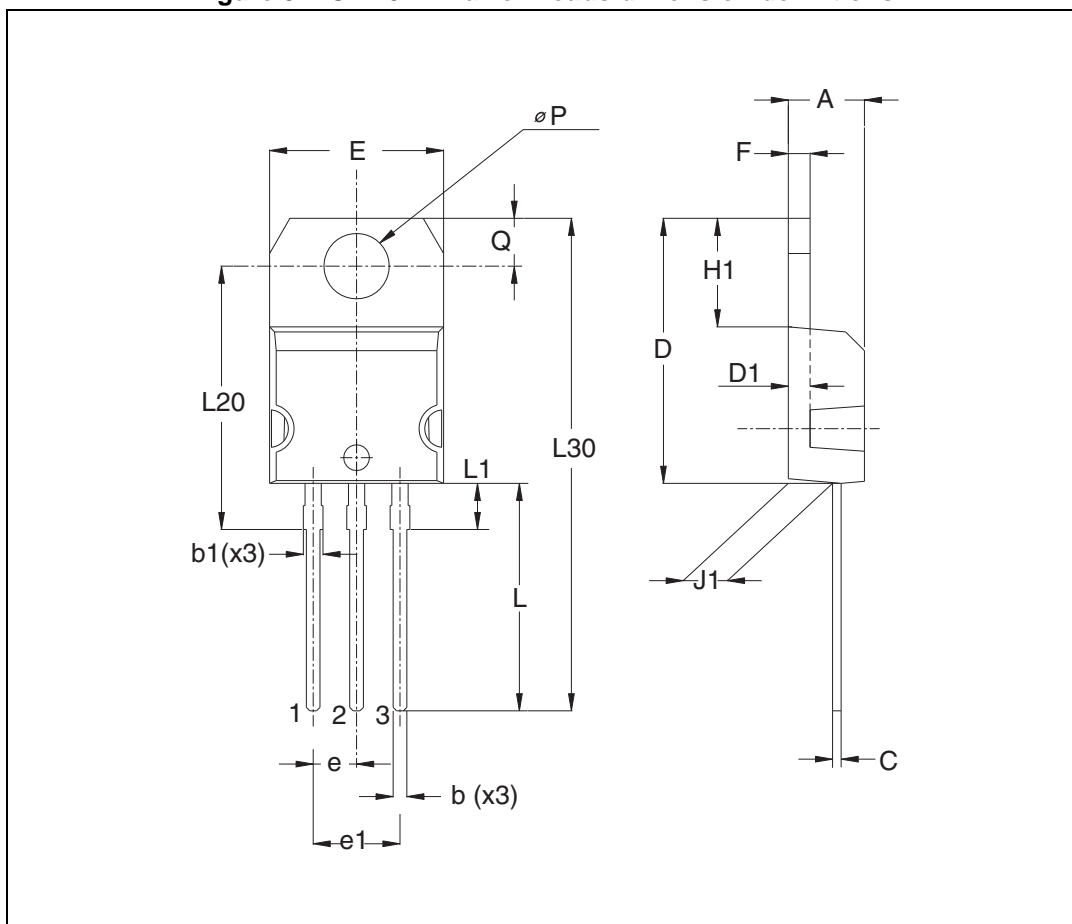




Table 6. TO-220AB narrow leads dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1		1.27			0.05	
E	10.00		10.40	0.39		0.41
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.51		0.55
L1	2.60		2.90	0.102		0.114
L20		15.40			0.61	
L30		28.90			1.14	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

Figure 10. TO-220FPAB dimension definitions

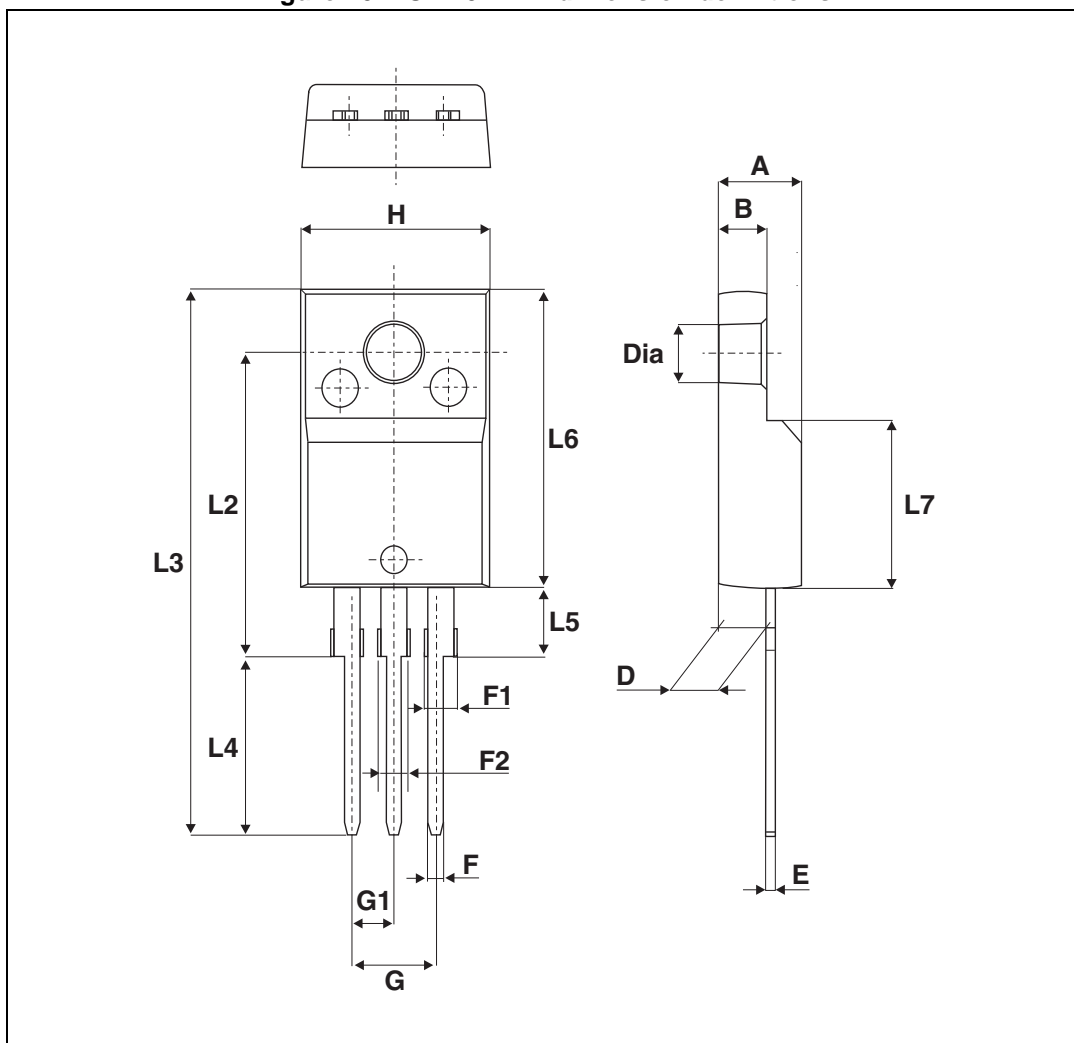


Table 7. TO-220FPAB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.018		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.70	0.045		0.067
F2	1.15		1.70	0.045		0.067
G	4.95		5.20	0.195		0.205
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16		.	0.63	
L3	28.6		30.6	1.126		1.205
L4	9.8		10.6	0.386		0.417
L5	2.9		3.6	0.114		0.142
L6	15.9		16.4	0.626		0.646
L7	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

Figure 11. D<sup>2</sup>PAK dimension definitions

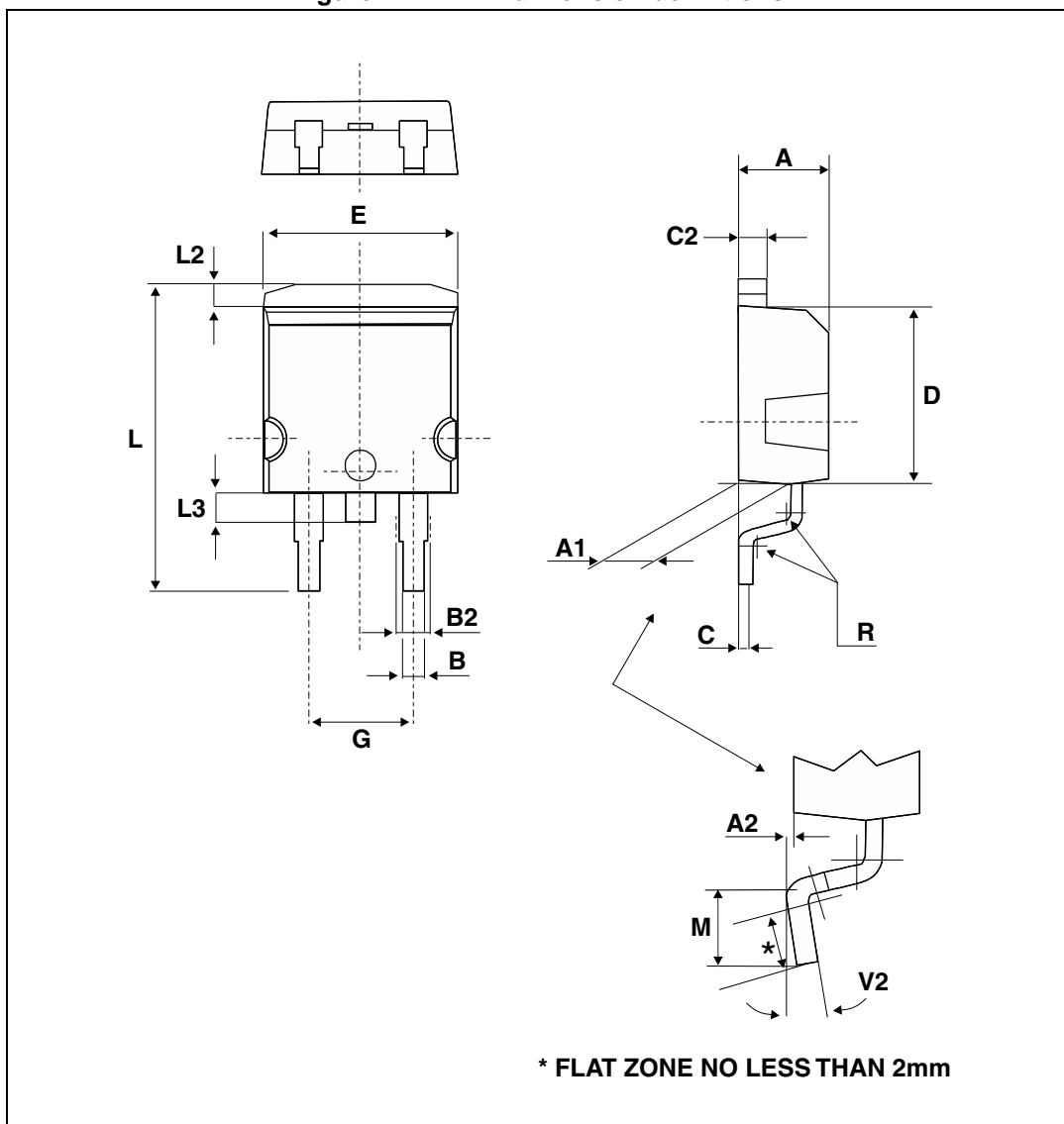
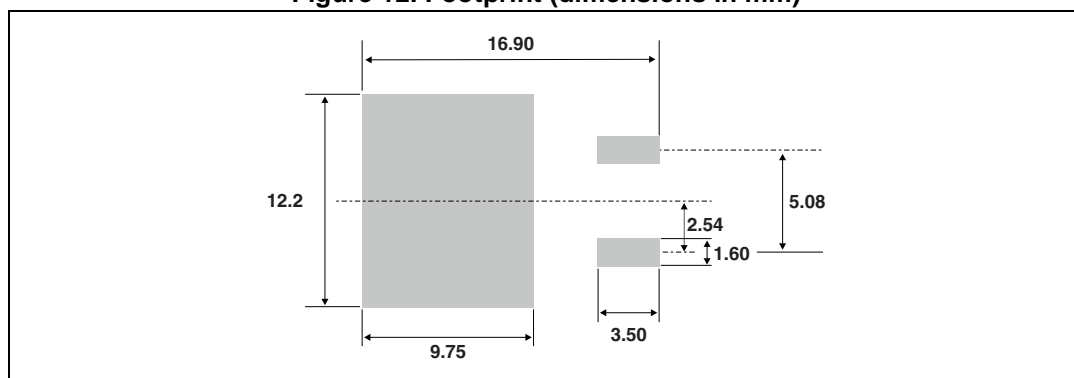


Table 8. D<sup>2</sup>PAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.037
B2	1.14		1.70	0.045		0.067
C	0.45		0.60	0.017		0.024
C2	1.23		1.36	0.048		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.40	0.393		0.409
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.30		1.75	0.051		0.069
M	2.29		2.79	0.090		0.110
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 12. Footprint (dimensions in mm)



### 3 Ordering information

**Table 9. Ordering information**

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20200CT	STPS20200CT	TO-220AB	2.20 g	50	Tube
STPS20200CTN	STPS20200CTN	TO-220AB narrow leads	1.90 g	50	Tube
STPS20200CFP	STPS20200CFP	TO-220FPAB	2.0 g	50	Tube
STPS20200CG-TR	STPS20200CG	D <sup>2</sup> PAK	1.48g	1000	Tape and reel

### 4 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
11-Apr-2013	1	First issue
16-Oct-2013	2	Updated <a href="#">Table 4</a> .

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